ATTACHMENT 2

COMMENTS OF KENNECOTT

ON

DRAFT RISK SCREENING ANALYSIS OF MINING WASTES (ICF INC.)

SEPTEMBER 21, 1987

GENERAL REMARKS

Risk screening is a good first step, but this methodology is unsuited for any further steps.

Risk screening analysis is a good first step toward setting regulatory priorities. Properly done, it can serve to screen out mining segments that pose little or no risk, and to determine what new data are needed. Until the results of the risk screen have been made available to us, it will not be possible to comment on whether those purposes have been carried out.

The methodology has been released[1/]. A great many conservative assumptions were made to simplify the analysis of many and various mining sites, to make up for lack of easily available data, and to ensure that no risks were underestimated. Many of these assumptions have been listed in Appendix D to the ICF report. In many cases the cumulative effect of such conservative assumptions is multiplicative, not additive. Thus, even if each separate assumption were reasonable for screening, the net effect of all of them together would grossly overestimate risk. A sensitivity analysis of the combined effects of many conservative assumptions should be added in the final report. It will be interesting to see whether, with so many conservative assumptions, the risk screen has actually succeeded in screening out a substantial fraction of mining sites. We urge EPA to recognize the conservative nature of the assumptions when interpreting the results. The methodology is certainly too simple and conservative for any purpose other than screening.

The document itself indicates that more than screening is intended. ICF states (p. 1-3) that its risk assessment serves four purposes.

First, it should help set priorities for collecting more information and data. We believe that even a crude approach such as this one can serve that purpose if it identifies mining segments which require only minimal regulation and no additional data collection.

Second, it "is the first step in refining the methodology that will be used in the RIA [Regulatory Impact Analysis] to analyze baseline risk imposed by mining waste management," (ref. 1, p 1-4). The crude assumptions used in this analysis make it totally unsuitable for even the first step of developing methods for an RIA. Because it will grossly overestimate risk, any RIA based on it would greatly exaggerate the benefits of regulation. When EPA seriously tries to evaluate "baseline risk imposed by mining waste

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1/ Risk Screening Analysis of Mining Wastes (Draft); by ICF Inc. for OSW, USEPA; July 23, 1987.

management," it should use site specific data, and where modeling is needed, the models used should be the most accurate ones available.

Third, the "screening risk assessment can also help EPA in formulating options for the regulatory program," (ref. 1, p 1-4). We think this is true in that the low-risk segments/pathways that need no regulation can be screened out. Beyond that, the analysis is too crude to influence regulatory decisions.

There is no reason to suppose that it would accurately assess even the relative risk from different segments or pathways. Thus, it is also useless in achieving its fourth objective, to "help further define and develop appropriate regulatory approaches," (ref. 1, p 1-5).

The next step must be far more accurate, so it will require site-specific data and assumptions.

As soon as EPA goes beyond initial screening, much more realistic assessment of risk will be needed.

First of all, the data used for the screen need to be checked before they are used again. A cursory examination of Appendix A revealed two errors concerning Kennecott operations:

- The underground lead-zinc-silver mine near the Bingham pit (ID #4025) has not been operated since the early 1970's.
- Kennecott's open pit copper mine (ID #2012) has a leaching operation which ICF appears to be unaware of.

Some of the waste concentration data may be out of date.

The best way to determine whether and to what extent people are exposed to pollutants is to measure concentrations, in air, water and soil where people live. Many of these data are already available, in EPA files, in state files, or from mining companies. These data should be used to the fullest extent; where they do not exist, such data should be measured when that is feasible. Modeling should be used only as a last resort for determining exposure.

When it is necessary to model, site-specific data should be used as inputs. Local geology, actual pollution controls already in use, and actual location of homes, wells, etc. should be taken into account. Each waste facility at a site should be separately characterized, as to location, size, shape, and waste characteristics. The most accurate models available should be used, and model accuracy should be verified using available data.

Other site-specific matters should be considered. For example, an impact on an aquifer which was never drinkable does not pose any risk. A case in point is the saline aquifer beneath the Utah Copper tailings pond near the Great Salt Lake.

The risk screen assessed only risk to the most exposed individual (MEI), not aggregate risk to population. Interestingly, this is directly opposite to the approach taken in the Superfund Hazard Ranking System, which ignores the MEI and considers only population risk. We think both are important, and both should be considered. The MEI risk should be assessed realistically, considering where people actually live and how they get their drinking water. Because many mines are in remote locations, these considerations can profoundly affect both absolute and relative risk estimates.

The screening assesses cancer risk based on EPA's usual linear, no-threshold assumption. Thus, as ICF points out, the risk estimates for all carcingens would be upper bounds, even assuming accurate exposure estimates. For ingested arsenic, the no-threshold assumption is untenable, in the face of data indicating that arsenic is an essential nutrient in trace amounts. EPA has recognized this fact in setting the proposed drinking water standard (50 FR 46960); EPA's risk assessment methodology should also recognize it.

Because there are so many site-specific factors, a general approach for all mines in the U.S. is impractical. Instead, EPA should develop guidelines for the states to use in assessing risks from mining wastes within their borders.

The following sections discuss specific points about ICF's risk screening for the air and water pathways, and about the sensitivity analysis.

WATER PATHWAYS

<u>The location of drinking water wells should be accurately characterized at each site.</u>

The assumption of a one meter distance for on-site residences is of particular concern. First, residences on the mining site may no longer exist since USGS maps are often not current. Second, even if the building is still intact it is unlikely that it is still a residence. It is much more likely that such previous residences are now storage buildings or offices for the mining operations. Consequently, the assumptions of exposure for 70 years, etc. are not appropriate at these locations. The first off-site residence presently existing would be a much more accurate estimator of location of the nearest drinking water well and is obtainable through questionnaire.

<u>The groundwater pathway use of actual leachate concentrations is good, but site-specific data should be used in later risk assessments.</u>

<u>The surface water scenario assumption of total dissolution of any runoff should not be used in further risk assessment activity.</u>

An example of some data are attached as an indicator of the inaccuracy of the assumption (from a memo to Kennecott from PEDCO dated December 2, 1980 regarding sampling conducted at then Kennecott's New Mexico facility). Typically, these data show the total solubilization assumption yields a 1000% overprediction in the metals concentrations available. The range of water soluble fraction to total assay varies from 0.00003% to 0.7%. Clearly, data on the water soluble (leachable) fraction are a more accurate representation of the bioavailable metals than total concentration data. The effect of using total assay data should be quantified and used as a justification for a critical evaluation of the screening results and for more data collection. One concern with the use of leachate data is the possible underestimation of the impact of suspended solids in the runoff. Such a concern should be handled separately from the soluble component. This is especially important since the model assumes a surface water drinking source to be immediately downstream of the runoff entry.

Better estimates of the bioavailable portion of waste constituents should be used in future risk assessment.

Site specific data on contaminant sources should be used.

The assumption of no control is extreme for active mines. For example, Kennecott's Bingham Canyon leaching facility utilizes concrete lined canals and collection facilities directly over bedrock to ensure no leachate escapes the facility. Indeed, leaching operations would be pointless without collection systems. Other common examples include stormwater runoff collection and mine water treatment systems.

The location and size of waste piles, tailings ponds, etc. should be accurately characterized; ICF assumes that the entire disturbed area is a waste pile.

The model used should account for recharge between the source and the drinking water well.

The present model only accounts for recharge on the waste site. This amounts to assuming it rains only on the site, never on the surroundings. The effect of this assumption could be significant in scenarios with shallow, slow moving aquifers.

Natural aquifer quality should be considered.

An impact on a naturally saline aquifer poses no risk.

Better groundwater models, already approved by EPA, exist and should be used in any future risk assessments.

These include the U.S.G.S. model and Dames and Moore's TARGET. There is no reason to use ICF's very crude assumption for anything beyond screening.

AIR PATHWAY

ICF used the ISC model for the inhalation and offsite direct contact pathways. This is the best (perhaps the only) model to apply to sources of windblown dust such as waste piles and tailings, when concentration data cannot be obtained. The full capabilities of the model should be used; in particular, the actual locations and shapes of different dust sources at the site can and should be input to ISC if it is used for any purpose beyond initial screening. (ICF states (p 4-20) that the ISC model superimposes all sources at a site--this is incorrect.[2/])

Site-specific emission factors should be developed because even within a single mining segment in a single geographic region, different sites can vary in factors like precipitation, evaporation and size distribution of particles. In the light of EPA's recent revision of the NAAQS for particulate matter (52 FR 24634), factors for emission of fine particles (less than 10 microns) should be used. Current control measures should be accounted for. For example, Kennecott keeps most (95% at present) of the tailings pond wet, and the berms of the pond are revegetated.

Receptors should be placed where people actually live, since lifetime effects are being modeled.

Data measured on site should be used to determine concentrations of toxic constituents in the waste. Bioavailability should be considered, especially for the ingestion route.

DIRECT CONTACT PATHWAY

The onsite direct contact pathway adds comic relief to an otherwise humorless document. Access to active mining sites is restricted for several reasons, notably safety. If some mine operators are lax in this regard, their operations can be regulated without performing a risk assessment.

The three examples of direct contact identified by EPA[3/] are all abandoned mining sites. Regulation may be needed under RCRA to prevent such scenarios from occurring after mining has ceased. Any such regulation should be based on site-specific waste composition data; no risk assessment would be needed.

SENSITIVITY ANALYSIS

<u>The impacts of the input assumptions need to be quantified to define future data needs.</u>

Many assumptions made in the risk screening deserve examination in the sensitivity analysis. Even if the effects of these assumptions are directly proportional to the input, the range of possible error due to combination of the several assumptions made should be estimated. This is the only way to ensure that the screening analysis is properly interpreted and that the proper data are collected in the future.

[2/] Industrial Source Complex (ISC) Dispersion Model User's Guide (1986).

[3/] EPA, Management of Mining Wastes, RCRA Subtitle D Regulatory Program Development, Detailed Management Plan, Appendix G (June 22, 1987).

The following assumptions should be studied:

- Distance of drinking water well
- Combination of waste characterization data
- The combination of waste management facility types
- The total assay concentration as all bioavailable in surface water runoff and in the ingestion pathway
- No control technology at the management site
- Total disturbed area representative of waste source area for groundwater modeling
- No area wide recharge

(AY711)

MINE NO.35 : INACTIVE LOW GRADE ORE

PARAM	RAW SAMPLE TOTAL ANALYSIS	ACETIC ACID EXTRACT ANALYSIS	WATER EXTRACT ANALYSIS	% of TOTAL
METALS				
AG		<.0100 MG/L	<.0100 MG/L	
AS	10.3000 UG/G	.0155 MG/L	.0099 MG/L	0.1
BA	31.7200 UG/G	.0470 MG/L	.0420 MG/L	0.1
BE	1.0500 UG/G	<.0080 MG/L	<.0080 MG/L	
CA	23600.0000 UG/G	330.0000 MG/L	230.0000 MG/L	0.1
CD	<250.6600 UG/G	.0710 MG/L	<.0100 MG/L	
CR	124.9100 UG/G	.0520 MG/L	.0260 MG/L	0.02
CU	888.9500 UG/G	<.0100 MG/L	<.0100 MG/L	
FE	88661.0000 UG/G	.0810 MG/L	.0280 MG/L	0.0000
HG	.2000 UG/G	<.0005 MG/L	<.0002 MG/L	
K	22448.0000 UG/G			
MG	5510.5000 UG/G	18.0000 MG/L	13.0000 MG/L	0.02
MN	3099.7002 UG/G	55.0000 MG/L	21.0000 MG/L	0.7
MO	176.0400 UG/G	<.0100 MG/L	<.0100 MG/L	
NA	6642.5996 UG/G	.6600 MG/L	1.2600 MG/L	0.01
NI	<24.5000 UG/G	.0940 MG/L	.0730 MG/L	
PB	502.3100 UG/G	<.0600 MG/L	<.0600 MG/L	
SB	143.9700 UG/G	<.0500 MG/L	<.0500 MG/L	
SE	30.5000 UG/G	.0556 MG/L	.0410 MG/L	0.1
TL	<201.3600 UG/G	<.2000 MG/L	<.2000 MG/L	
V	67.7900 UG/G	.0400 MG/L	.0220 MG/L	0.03
ZN	3005.7002 UG/G	15.9000 MG/L	1.7200 MG/L	0.05
			Average	0.11
RADIONUCLIDES				
GA				
GB				
AC28				
BI12				
BI14				
PB10				
PO10				
RA26				
TH28				
TH30				
TH32				
U234				
U235				
U238				
ANIONS & OTHERS				
NH3				
NO3		<.0200 MG/LN	.0100 MG/LN	
F	1978.0000 UG/G		1.4800 MG/L	
TP	946.0000 UG/GP	.0100 MG/LP	<.0500 MG/LP	
SO4		499.0000 MG/L	398.0000 MG/L	
TOC			6.1000 MG/L	
POTA	38377.0000 UGCARB/G			
SOL	90.2000 %-WT			